

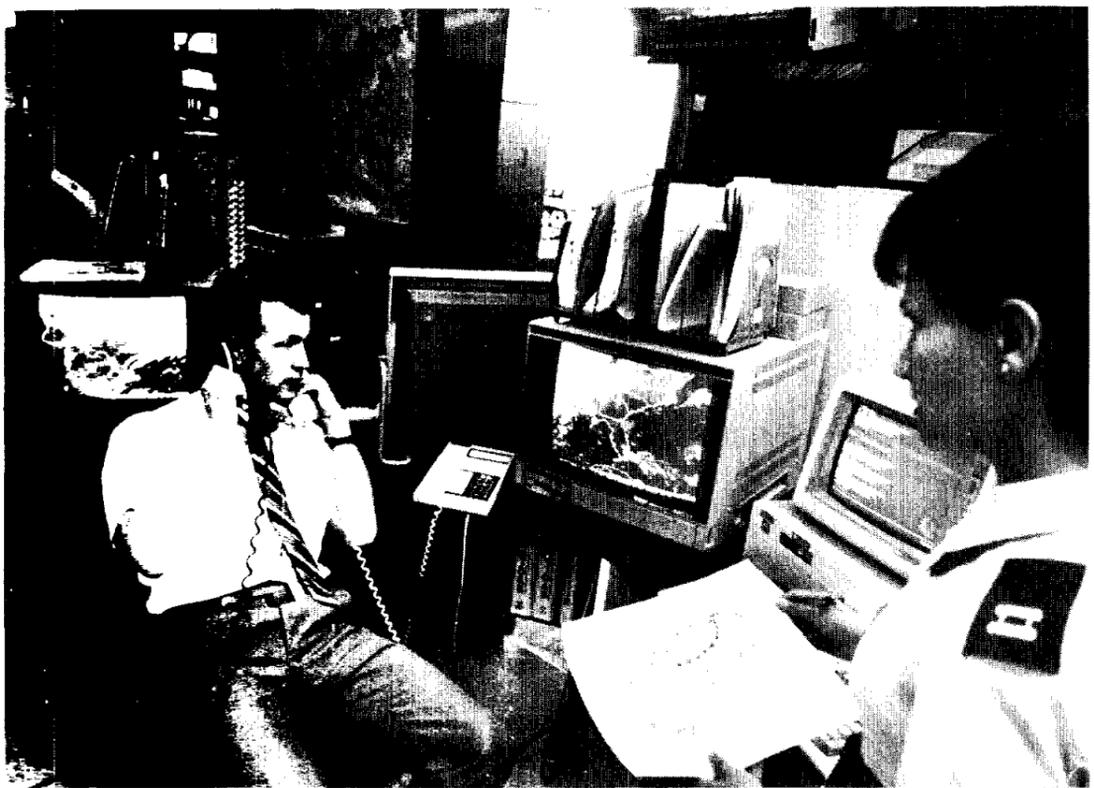


Space News Roundup

Vol. 27

October 21, 1988

No. 34



Steve Sokol, lead weather forecaster for STS-26, uses one phone to communicate with the flight director while keeping in touch with one of his information sources on the other. Air Force Capt. Deanna Ramirez waits to discuss the latest weather developments.

Keeping a weather eye out

JSC's meteorologists watch conditions worldwide

By Kelly Humphries

Hidden behind the concrete lattice-work over the Mission Control Center lobby are the offices of JSC's Spaceflight Meteorology Group.

It's common knowledge that the Air Force monitors weather conditions for Space Shuttle launches at Kennedy Space Center, but many people don't know that after launch JSC takes charge of worldwide weather monitoring.

"Once the Shuttle clears the tower, that's when our work begins," says Steve Sokol, the National Oceanic and Atmospheric Administration (NOAA) meteorologist who was lead forecaster for the STS-26 mission.

And even before liftoff, the nine NOAA contractors in Bldg. 30 work closely with the Air Force, providing information about weather at abort landing sites that can mean the difference between launching and scrubbing.

The meteorologists' primary job is forecasting and tracking the weather

at all potential Shuttle landing sites during ascent and entry. Once the Orbiter is successfully in orbit, they provide daily briefings for the flight directors about one hour after every shift handover. Sokol worked with Doris Rotzoll and Chuck Morrill to provide ascent and entry weather information for STS-26.

Sokol says his group's main concern is to ensure that ceilings and visibilities will allow the Shuttle crew to see the runway Precision Approach Path Indicator (PAPI) lights.

"The Orbiter is coming down at such a steep glide slope, and they can't go around to another airport like a normal commercial airliner," Sokol explains. "They have very strict rules on their weather, like no rain showers anywhere nearby. The ceilings generally have to be about 8,000 feet and visibility about 5 miles so that they can see these lights when they break out."

At the Shuttle Landing Facility in Florida, he says, forecasting the

weather for return to launch site (RTLS) aborts generally is a problem because of the virtually tropical environment. Finding a time when good weather at the Cape coincides with good weather at all the abort landing sites can be difficult, according to the veteran of hurricane reconnaissance flying.

STS-26 is a case in point. Ben Guerir, Morocco, had been selected as the primary trans-Atlantic abort (TAL) site, but rain showers in their forecast led Sokol to recommend to Flight Director Gary Coen that Moron, Spain, be the first TAL choice. Then Bud Ream, the Weather CAPCOM at Moron, reported that non-weather conditions were affecting visibility there.

"The farmers were burning their fields," Sokol says. "He (Ream) called up and said visibility was less than 5 miles from burning smoke. Out of nowhere there was another problem and suddenly Moron was a no go."

Please see **WEATHER**, Page 4.

Atlantis gets ready to roll for STS-27

The Orbiter *Atlantis* is undergoing final preparations at Kennedy Space Center for her third trip to space, currently scheduled to be launched in less than a month.

The same modifications made to *Discovery* have been completed on *Atlantis*, a veteran of Shuttle missions 51-J in October 1985 and 61-B in November 1985, and the

checks and functional landing gear tests also have been conducted.

One minor problem—an actuator for the left outboard elevator that needed to be replaced—caused a slight delay in rollover. Several pressure readings from the actuator

proved inconclusive during a frequency response test of *Atlantis'* aerodynamic surfaces. It was



STS-27

Orbiter is getting final touches in Bay 2 of Kennedy's Orbiter Processing Facility. Rollover of *Atlantis* to the Vertical Assembly Building (VAB) for mating to the external tank (ET) and solid rocket boosters (SRBs) is planned to be done no earlier than 12:01 a.m. Sunday.

Launch is now planned for Nov. 19, and *Atlantis'* mission will be dedicated to the Department of Defense.

This week, technicians have been finishing work on closing out cavities in the thermal protection system following inspections. Structural leak

removed Monday and shipped to the vendor for analysis.

Technicians completed installation of a new actuator Tuesday and filled the hydraulic system. The performance of the new actuator was to be tested late this week.

Once *Atlantis* has been moved to the VAB, the Orbiter will be hoisted vertically, lowered into position and mated to the already connected ET and SRBs. The mating is scheduled to take about a week, after which the Shuttle will be rolled out to Launch Pad 39B.

Inspections bear out solid rocket redesign

Post-flight inspections of the STS-26 solid rocket motors (SRMs) have borne out the integrity of redesign efforts, with the disassembled field joints and case-to-nozzle joints showing good performances, JSC Project Integration Engineer Rod Lofton said Monday.

"The field joints looked really good, with no blow-by, no hot gases to any of the O-rings, and the J-seal performed well," Lofton said. "There's nothing in the field joints that's preventing us from flying STS-27."

The redesigned case-to-nozzle joint also performed well, Lofton said. No evidence of seal damage, blow-by or pressure reaching past the wiper O-ring was found.

"We're very pleased and encouraged by the results," Lofton added.

The factory joints will not be fully

inspected until the boosters are shipped back to Morton Thiokol, but a preliminary look indicated excellent results.

The two boosters splashed down about 120 nautical miles downrange of Kennedy Space Center, both within nine nautical miles of their respective recovery ships. The two ships, the *Freedom Star* and *Liberty Star*, began towing the SRMs back a little more than six hours after launch. They arrived in port the following afternoon.

As the field joints were disassembled throughout the week, nothing unusual was found, and the three O-rings in each joint were labeled in "excellent condition." However, the impacts of the boosters' splash downs were evident on the exterior of the field joints.

Please see **REDESIGN**, Page 4.

Electrical fire causes minor Magellan damage

The Magellan spacecraft scheduled for launch in April experienced a small electrical fire Monday when workers apparently connected a test battery incorrectly.

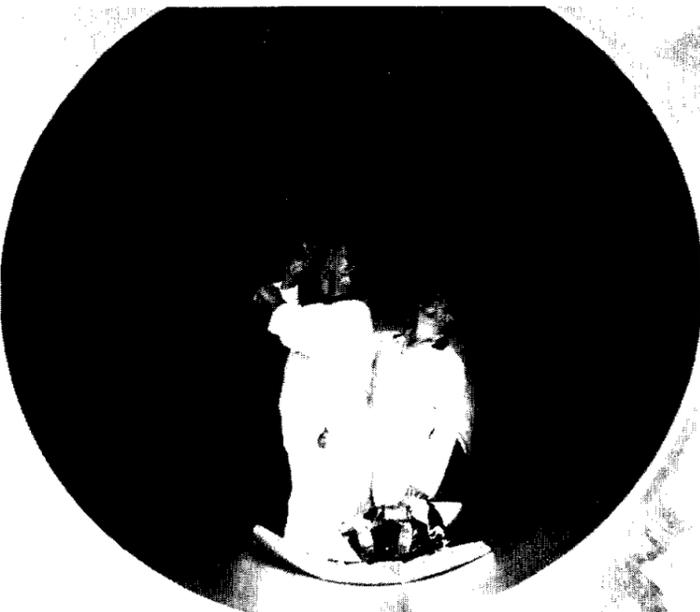
The fire was put out within 1 minute, and damage appears to be limited to a test battery and harness that are not part of the flight hardware, and to spacecraft insulation blankets in the area of the battery, said Vince Wirth, Magellan test and integration manager for NASA's Jet Propulsion Laboratory (JPL).

The initial recovery plan consists of cleaning and inspecting the spacecraft and replacing a flight harness connector involved in the fire, he said. The cleanup is not expected to affect the April 28, 1989, launch date of STS-30. Program and project officials from

NASA Headquarters and JPL, have convened an investigation board.

Smoke and a small flame appeared in the area of the Magellan test battery about 10 p.m. CDT Monday as workers in the Spacecraft Assembly and Encapsulation Facility at Kennedy Space Center were performing an unpowered cable-up of the battery. The fire was extinguished immediately and systems secured. Preliminary investigation indicates the flight harness connector was incorrectly inserted into the battery harness receptacle, causing a direct short on the battery, Wirth said.

Magellan is to be released from the payload bay of the Space Shuttle *Atlantis*, spend 446 days traveling to Venus, and orbit the planet, penetrating its turbulent atmosphere with sophisticated radar.



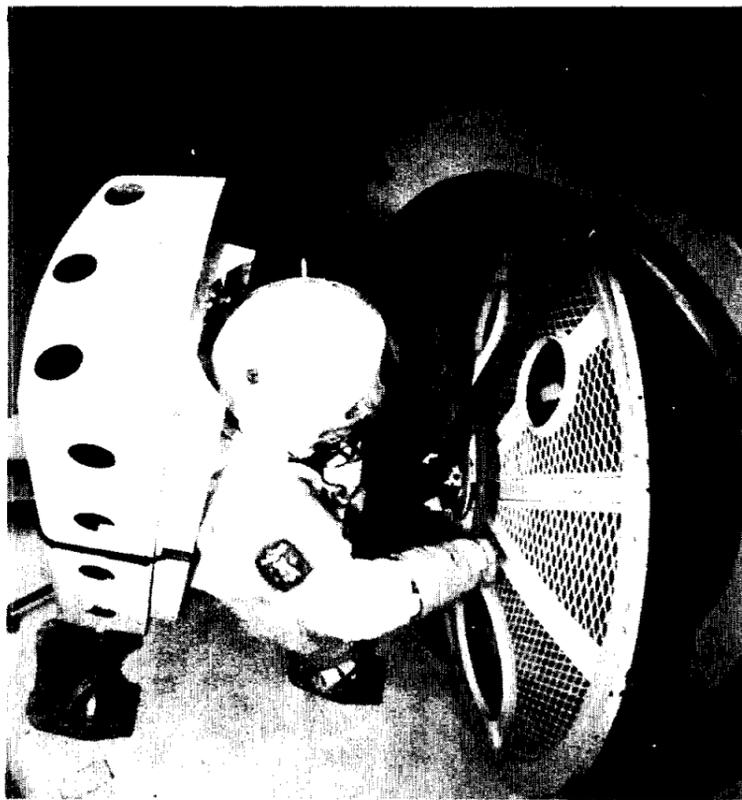
MOTOR MIDDLE—Engineers closely inspect one of the STS-27 solid rocket boosters shortly after its arrival at Kennedy Space Center.

Next president must set goal, Fletcher says

NASA Administrator James C. Fletcher listed four long-term options for manned exploration of the solar system Tuesday and said the next president must choose a specific goal in space.

"The next president must set the nation solidly on course for the future," Fletcher said in an address to the National Press Club in Washington, D.C. "He must do this by challenging the United States to achieve a specific, long-term goal in space, by setting a timetable, and by directing NASA to get on with it."

NASA's Office of Exploration, created a year ago, will release its first annual report in the near future, and that report will include case studies of four potential manned missions. Please see **FLETCHER**, Page 4.



JSC Photo

HANDY HATCH — Astronaut Greg Harbaugh opens a mockup of a pressure-assisted hatch during evaluations of a space station airlock concept in WET-F recently. The hatch concept, created by JSC's Charles S. Allton, is assisted in sealing with pressure from either direction, and could prove valuable in allowing future airlock hatches to have fewer moving parts, be simpler and be more easily constructed, among other advantages.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays:

General Cinema (valid for one year): \$3 each.

AMC Theater (valid until May 31): \$2.95.

Sea World—San Antonio (year): children, \$13.56; adults, \$15.96.

Renaissance Festival (weekends in October through Nov. 15): children (5-

12), \$4; adults, \$8. Bus trip Nov. 5, children (0-6) \$6, children (6-12) \$7, adults, \$10.

Children's Halloween Party, Oct. 31., children (0-12), \$3.50; adults, \$1. Halloween Dance, Oct. 29, \$10 per couple.

Muppet Babies in "Where's Animal?" at the Summit, 11 a.m. Oct. 29, \$6.50.

Delta Downs bus trips, Nov. 19, \$18 (day trip) and \$50 (overnight).

JSC

Swap Shop

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Property

Rent: Alvin area, 2-2-CP, 2 story house, ceiling fan, W/D, large storage room, 24 fenced acres, barn with stalls, \$550. Terri, 283-7320 or Aubrey, 331-0414.

Lease: University Place condo, bedroom/study, W/D, D/W, ceiling fans, pool, exercise room, balcony & 1 carport, \$395/mo. Barbara, 282-4616.

Rent: Beachfront condo on Seawall Blvd., sleeps 6 with all amenities, \$490/week or \$79/day. 332-1614.

Rent: Mobile home lot, \$85/mo., \$50 dep., Baker and Kinne, Baycliff. 488-1758.

Sale: University Green patio home, 2/study/2/2D, clean and bright, several amenities, \$98,700. Bob Allgeier, 488-0397.

Lease: Lake Tahoe condo at Heavenly Valley ski lift, accommodates 6, furnished, incl. complete kitchen facilities, avail. 20-26 March 1989, \$425. Cookie, 474-5610.

Sale: Friendswood/Sun Meadow Estates, wooded lot in established neighborhood, cul-de-sac, bordered by stream & gold course on 2 sides, approx. 245' deep & up to 86' wide, approx 1/3 acre, utilities on site, \$31,500. Doug x32860 or 486-7412.

Sale: Middlebrook, 3-2-2, study, FPL, wet bar, covered patio, large lot, ex. cond., FHA assum. 10%. 480-9363.

Sale: Madisonville, TX, 18.763 unimproved acres, timber, mostly hardwoods, good road, electricity, telephone, water avail., ex. squirrel and deer hunting, \$950/acre. Roland, 480-3377 or 538-1697.

Sale: Kirkwood South, large custom 2-story, 4-2.5-2, 2400 sq. ft., formals, family room, FPL, study, intercom, oversized cul-de-sac lot, near Dobie H.S., \$76,500. 488-5210.

Lease: Galveston beachfront home, 3-1.5, 2 decks, spectacular view, quiet pedestrian beach, fully furnished, no smokers, no pets, dep., \$300/3 day weekend, \$500/wk, \$1500/mo. 436-1070.

Rent: Seabrook, 1-1, FPL, W/D, upstairs, tennis courts/pool, corner unit, co-op lease avail. \$295/mo. 681-4732.

Sale: League City, Lakeside, 1984 mobile home, 3-2, 14' x 80', skirted, on beautiful 50' x 150' wooded lot, 8' x 10' storage bldg. w/power and security light, Clear Creek school dist., \$27,000. 334-1883 or 334-3037.

Lease: Clear Lake City, 3-2-2, quiet neighborhood, no thru street, \$500/mo., avail. Nov. 15. 326-6782.

Vacation Rental: Lake Livingston waterfront, 3-2, fully furnished, covered decks, pier, ex. fishing, swimming, skiing, new cond. 482-1582.

Sale: League City, 1980 mobile home, 2-1, 14' x 56', great cond., w/carport, assume FHA load, \$122/mo. plus low equity. Scott, x37115 or 485-4364.

Sale: Big Bend area hunting land, 160 acres, \$170/acre, OBO. 337-4051.

Sale: 1978 Champion Manatee mobile home, 3-2, 16' x 80', all appliances, mini-blinds, garden tub, island bar, and more. \$1000/down, \$298.05/mo. Tammy, 339-1206.

Cars & Trucks

'87 Honda Accord DX, ex. cond., standard, beige color, \$10,000, OBO. 480-6823 or 337-3960.

'84 Pontiac Fiero SE, all the good options. Rick, x32695 or 559-2735.

'84 Pontiac Trans Am, dark blue, loaded, T-tops, V-8 eng., new Dunlop racing tires, ex. cond., \$6,000. Tina Hay, 280-7505, days or Cameron or Tina Hay, 331-5815, evenings.

'86 Toyota Corolla, AM/FM/stereo cass., 3 new tires, 42K mi., white, A/C, new battery, w/tinted windows, \$600 cash and take up payments. 731-7792.

'84 VW Rabbit, Wolfsburg Edition, 5 spd, A/C, AM/FM stereo cass., 80K mi., good cond., \$3,795. Plauché, x39034.

'87 Caprice Classic, loaded, 50K mi., silver, 4 dr., ex. cond. \$6,300. Bob, 920-5406 or 487-1535.

'80 Ford Mustang, white, red int., 6-cyl., auto., A/C, P/B, P/S, AM/FM/cass., 75K mi., ex. cond., \$1,500. Than, 333-6510 or 484-5366.

'81 Datsun 280Z Classic, 5 spd., A/C, AM/FM stereo, ex. cond., \$3,875. John, 538-1711.

'83 GMC full size Jimmy 4x4, 305 cu. in. V-8, 4 spd. standard, loaded, 69K mi. \$6,750. (409) 925-7765.

'84 Dodge Ram Charger, Prospector pkg., Royal SE pkg., P/S, P/B, auto, tilt, AM/FM, Posi-Track, cruise, A/C, auto, delay wipers, 318 V-8, 44K mi., blue/blue, ex. cond., \$7,400. 333-2395.

'81 Toyota Corolla SR-5, liftback, A/C, P/S, P/B, blue, AM/FM/cass., w/eq., new int., 100K mi., ex. cond., \$1,995. Ben, 280-7336 or 482-8998.

'85 Chrysler Laser, P/S, P/B, 4 cyl. auto., burgandy and gray int., good cond., \$4,600, OBO. Emanuele, 282-4702 or (409) 945-9787.

'85 Astro Van customized V-6, 33K mi., 4 capt. chairs, rear seat, \$8,500. Charley, 488-9005 or 480-7401.

'84 Ford Mustang, dark gray, auto., P/S, P/B, A/C, hatchback, 61K mi., \$4,600. Carolyn 282-4506 or 326-1246.

'85 Camaro Berlinetta V-8 w/T-tops, 4bbl Quadra-jet, digital, AM/FM/cass., tinted glass, A/C, P/S, P/W, 2 new tires, black w/tan int., low miles, \$9,500, OBO. Leslie, 482-6491.

Today

Quality Partnership Award—JSC Safety Reliability and Quality Assurance (SR&QA) Office has named this week as JSC Quality Week to celebrate National Quality Month. Nominations will be solicited from the JSC community for the Quality Partnership Award which has been established to recognize non-Quality Assurance professionals for their contributions to quality at JSC. For guidelines and eligibility information call Ron Theriot, 280-7428.

Combined Federal Campaign—JSC Combined Federal Campaign will run through Nov. 10. This year's goal is \$265,000. Campaign representatives will be calling on JSC employees during the campaign. Anyone who does not know who their representative is may call Teresa Sullivan, JSC campaign coordinator, at x38970. Retirees may call Sullivan at 483-8970.

EAA badges—Dependents and spouses may apply for a photo I.D. badge from 6:30-10 p.m., Monday through Friday at the Rec Center.

Cafeteria menu—Entrees: seafood gumbo, deviled crabs, broiled codfish, liver and onions, barbecue link (special). Vegetables: buttered corn, green beans, new potatoes.

Saturday

Defensive driving—Course is 8 a.m.- 5 p.m. Oct. 22 or Nov. 19. Cost is \$20.

Monday

Cafeteria menu—Entrees: French onion soup; barbecue sliced beef, parmesan steak, spare rib with kraut, chili and macaroni (special). Vegetables: ranch beans, English peas, mustard greens.

Tuesday

BAPCO meets—The next meeting for the Bay Area PC Organization (BAPCO) will be at 7:30 p.m. Oct. 25 at the League City Bank and Trust.

For more information, call Earl Rubenstein, x34807, or Ron Waldbilg, 337-5074.

Cafeteria menu—Entrees: split pea soup, meatballs and spaghetti, liver and onions, baked ham w/sauce, corned beef hash (special); Vegetables: buttered cabbage, cream style corn, whipped potatoes.

Wednesday

National Management Association—Art Dula, an attorney specializing in space law, will speak on "Negotiating with the Russians for Fun and Profit" at the next meeting of the NASA JSC Chapter of the National Management Association (NMA). Social hour begins at 5 p.m. Oct. 26 at the Rec Center ballroom. Dinner will be served at 6 p.m. Call Ann Hammond at x32933 before noon for reservations. Cost of a guest dinner is \$8. For more information, call Gerald Chapman at x34848.

End user conference—The Data Processing Systems Division will host a DPSD—Supported End User Products Conference from 9:30-4 p.m. Oct. 26-27 in the Product Demonstration Facility (PDF), Bldg. 12, Rm. 112. End users will have an opportunity to explore DPSD-supported software and hardware products already in use, and see selected products they may want to consider purchasing. For more information, call the PDF at x37572.

SEDS meeting—The University of Houston—Clear Lake chapter of Students for the Exploration and Development of Space will meet at 7 p.m. Oct. 26 in Rm. 2-508 of the university's Bayou Bldg. NASA co-op students and all working students are invited to attend. For more information call Peter Lange, x30850.

Cafeteria menu—seafood gumbo; cheese enchiladas, roast pork and dressing, barbecue link (special); Vegetables: pinto beans, Spanish rice, turnip greens.

Thursday

Mexican American Engineering Society—MAES will hold a membership drive from 5 to 9:30 p.m. Oct. 27 in Rm. 216 of the Rec Center. For more information call Mary Flores, x37284, or Oscar Olszewski, 333-6218.

Weight safety—The next weight safety course required for employees wishing to use the Rec Center weight room will be from 8-9:30 p.m. Cost is \$4.

Borman autographs—Former astronaut Frank Borman will be autographing copies of his autobiography, "Countdown" from 5:30 to 7 p.m. Oct. 27 at Jeremy's Bookshelf, 2441 Bay Area Boulevard. Memoirs of his Gemini 7 and Apollo 8 missions as an astronaut are presented.

Cafeteria menu—Entrees: beef and barley soup; roast beef with dressing, fried perch, chopped sirloin, chicken fried steak (special). Vegetables: whipped potatoes, peas and carrots, buttered squash.

Nov. 1

Space conference and exposition—The second annual Space Technology, Commerce and Communications Conference and Exposition will feature products of major international exhibitors as more than 100 speakers in specialized conference sessions, receptions and awards. The conference will be held Nov. 1-4 at the George R. Brown Convention Center. Free shuttle buses will be available to convey NASA personnel, contractors and Clear Lake business people. A bus will pick up passengers on Avenue D in front of the Visitor Center and deliver them directly to the convention center. Buses will depart from JSC at 9:15 a.m. and 1:30 p.m., arriving at 10 a.m. and 2:15 p.m. On the return leg, buses will leave the convention center at 12:30 and 4 p.m., arriving at JSC at 1:15 and 5 p.m. For more information call (617) 292-6480.

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Lease: Clear Lake City, 3-2-2, quiet neighborhood, no thru street, \$500/mo., avail. Nov. 15. 326-6782.

'78 Honda Civic, 4 dr., brown, liftback, \$600, OBO. 480-2467.

Cycles

BMW K75C, 750 cc, water-cooled, 8,300 mi., black, BMW bags, new tires, factory warranty, \$3,550. John, x36484 or 486-1186.

'80 Honda CB 750F, silver, good Dunlops, S.S. Super Trapp, K&N air filter, ultra reliable, \$1,000. Bruce, x34925 or 923-4571.

Boats & Planes

'76 16' VIP tri-hull boat, 115hp Evinrude with 2 S.S. props and 2 alum. props, McClain galv. tilt drive on trailer, new tires and spare, Bimini top, AM/FM cass. stereo, Lowrance depth finder, good cond., \$2,995, OBO. 280-8855.

14' Lido sailboat w/2 sets of sails and trailer, \$500. 534-4260.

Surf Jet, powered surf board, fast, fun, runs like new, \$1,075. 354-7168.

'85 23' Welcraft, clean. 485-0900.

Audiovisual & Computers

Leading Edge model P, XT compt., 20 MHD, hi-res. color monitor, EGA, Word Perfect, Lotus 1-2-3, Microsoft mouse, Pro-Design, 1 year warranty, \$1,895. John, x36484 or 486-1186.

Apple II+, 2 disk drives, modem, green monitor, business, stock market, home, game software, paddles, lots of extras. \$750. Bob, x30152.

Amigaworld magazine, vols. 1 & 2, first eight issues. David, x36647 or 526-3045.

Household

Simmons sofa bed, like new, white, fabric lined, textured naugahyde, firm mattress, \$150. Cookie, 474-5610.

Mirrors, gold-veined, 45" x 91 1/2", two each like new, \$200 for two or \$125 ea., OBO. Doug, x32860 or 486-7412.

GE portable 5" color TV, with stereo AM/FM "removeable" cass., like new—in box, \$169. C.W., 282-1871 or 280-8796.

7' contemporary couch, white/taupe Herculon, ex. cond., \$150, OBO. Kathie, x32483 or 488-7572.

L-shaped, sectional couch, ex. cond., \$200. Tammy, 282-4455.

Antiques for sale, drop leaf table, \$225; army foot locker w/brass corners, \$85; new Westclair lamp, handpainted w/beige colors, \$90. Kimberly, x30274.

French provincial chair, suitable for bedroom or formal living room, light blue/gray, ex. cond., \$40, OBO. Ray, x33954.

Sofa and loveseat, beige, brown and golden colored twill, sturdy structure, good cond., \$150 for both, OBO. x31636 or 481-8595.

Sofa and chair, ex. cond., \$100. x36186 or x35046.

King size bed headboard, solid maple, ex. cond., \$125. John, x38178 or 482-5837.

Antiques, two wood-burning stoves, butcher

block, \$250; 3 occasional tables, mahogany table with 4 chairs, \$250; iron bed, \$200. 482-1582.

2 early American loveseats, \$150. Paul, 282-3239.

Sears twin white beds with canopies, mattress, box springs, \$150 for both; Ben Franklin black cast iron stove, great for cabins, never used, \$100. Janet, x37355 or 554-4974.

Wanted

Want to buy electric trains. Don, x37832 or 996-1425.

Want wardrobe for storing hanging clothes, prefer a large one. Bob, 488-0397.

Want early model VW Scirocco or Jetta, running or not. Ken Mathew, x35023 or (409) 925-2777.

Want to trade \$10,000 electronic organ for land, car, truck, or boat of equal value, OBO. 337-4051.

Want '82-'86 basic Ford F-150, Chevy C-10, GMC pickup, auto, P/S, short bed, pref. "Fleet-side." x31604 or 333-3103.

Photographic

Bessler 4x5 B&W enlarger, 50 and 75 mm lens, lens boards, carriers, filters, \$500, OBO. x37696 or 482-1558.

Pets & Livestock

AKC registered German Shepherd, female, 10 months old, shots, BO. 480-5772.

Cocker Spaniels, male and female, 6 wks old, purebred, AKC, \$150. Steve, x36637 or 923-8707.

Horse pasture and stall for rent, Peartland/Friendswood area, \$50/mo. partial board, \$150/mo. full board. Myron, x39419 or 482-8647.

Free kittens, friendly with small children. Myron, x39419 or 482-8647.

Beautiful, healthy Sheltie puppies, 4 males, ready to go, born August 24, 1988. Frances, x33723 or Laurie Mount, 486-0584.

Free to good home, one kitten, female, 7 mos., sweet disposition; one mama cat, 3 yrs, spayed, loves people. Mary, x32576.

Stalls and/or pasture for rent, 15 acres, trails. 534-2806.

Musical Instruments

Selmer-Bundy cornet in good cond., \$120, OBO. 474-5639 or 282-3288.

Lost & Found

Lost puppy found near Avenue B East Gatehouse, Spaniel mix, needs a home. x38589.

Personal

Reunion: November 3, 1988, Gilruth Pavilion, Earth Resources Research Division personnel, NASA, contractor, USDA, NOAA, etc., please contact B. A. Cox, x33151 or C. Wheelock, 282-1900.

Miscellaneous

New AM/FM stereo cassette auto radio, Realistic's best, model #12-1929, still boxed with service manual, \$125. Tom Clark, x39842.

Riding lawn mower, 11hp, 38" cut, elec. start, good tires, \$500. Terri, 283-7320 or Aubrey, 331-0414.

Leader LSW-333 Sweep/Marker generator, \$150; Leader LSG-231 FM stereo signal generator, \$75, both new with all manuals. Tom Clark, x39842.

Sliding glass door complete with alum. frame, 6' or 8' wide, very good cond., \$95. John, x38178 or 482-5832.

Girl's 24" 10-spd bicycle, \$30. 334-1867.

Altec custom voice of the theater sound reinforcement speaker system, \$1,000. 480-9363.

Four (4) S/S Crager rims with chrome valve stems, chrome locks on all four, less than 1 year old, 13" rims, like new, was \$355, now \$275. Brenda, x37747.

Colt CAR-15 carbine .223 cal

NASA turns 30, focuses on future

NASA is marking its 30th anniversary this month by pondering past scientific and technological accomplishments that have pioneered the space frontier while casting a keen sight on future exploration.

"As we celebrate the establishment of NASA ... I hope we will also take a moment to reflect on how privileged we are, as public servants, to have been entrusted by the American people with such exciting and challenging missions - missions of critical importance to the scientific, technological and economic strength and well being of this country," said NASA Administrator Dr. James C. Fletcher.

"After 30 years, NASA has achieved a vigorous maturity," Fletcher said. "Now, we have the ability, the unending challenge, and, I believe, the support of the American people to make the next 30 years just as memorable as those we celebrate today."

NASA's beginnings

The Soviet launch Oct. 4, 1957, of Sputnik I, the world's first artificial satellite, spurred growing political support in the United States for a national space program and, in 1958, President Eisenhower signed into law the National Aeronautics and Space Act. The act established a national aeronautics and space agency that officially began operating Oct. 1, 1958.

The historic space act establishing NASA initiated a broad charter for civilian aeronautical and space research, and provided for the broadest possible dissemination of information to the public. NASA, with T. Keith Glennan at the helm, absorbed the existing National Advisory Committee for Aeronautics (NACA) and incorporated related programs from other government programs.

On Jan. 31, 1958, the first American satellite, Explorer 1, went into orbit. An on board experiment developed by Professor James A. Van Allen encountered mysterious radiation levels at 603 miles altitude, leading to the discovery of the Van Allen radiation belt.

Manned spaceflight

The Soviets launched the first successful manned space mission when Cosmonaut Yuri Gagarin traveled into space aboard Vostok 1 on April 12, 1961. The Mercury program, which began just after NACA became NASA, was America's manned space flight program. Alan B. Shepard, Jr. was the first American to fly in space in the Freedom 7 Mercury spacecraft on May 5, 1961. John H. Glenn Jr. became the first American to orbit the Earth on Feb. 20, 1962.

The space flights in the two-man Gemini spacecraft in 1965 and 1966 provided mastery of technology and skills that were crucial to later flights; maneuvering in space, rendezvous and docking with another vehicle in space, extravehicular activities and demonstrating that man could function effectively in space for as long as two weeks with no lasting harmful after effects.

President Kennedy announced May 25, 1961, a national goal of "landing a man on the moon and returning him safely to Earth" within a decade. That goal became a reality on July 20, 1969 when astronaut Neil Armstrong left his footprints on the lunar surface. Six Apollo expeditions explored the moon, the last in December 1972.

Skylab, America's first space station, enabled three astronaut crews to live and work for long periods, the longest lasting 84 days. It was followed by the Apollo-Soyuz Test Project in 1975—the world's first internationally manned space mission.

With the launch of the Space Shuttle *Columbia* April 12, 1981, the United States entered a new era in space transportation. The National Space Transportation System (NSTS) opened space for regularly scheduled transportation of people and cargo between Earth and Earth orbit.

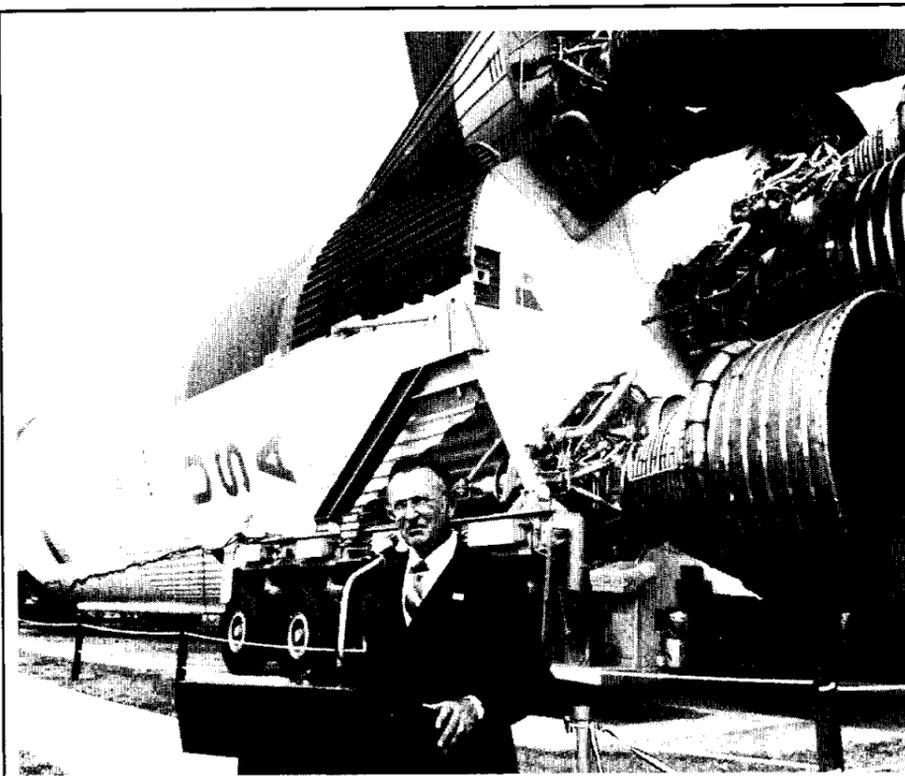
NSTS has launched 25 successful flights, including the most recent flight of the STS-26 crew aboard the shuttle *Discovery*. The 25th shuttle flight in January 1986 ended in the explosion of the Orbiter *Challenger* and the deaths of its crew. The *Challenger* accident led to a re-evaluation of the shuttle's systems and the shuttle management process.

Aeronautics

When NACA became NASA in 1958, the agency already had been involved in basic and applied aeronautics research for more than 40 years.

U.S. aeronautical programs run the gamut from fundamental disciplinary research to flight testing, with primary research subjects being the vehicles and power plants that use the Earth's atmosphere for flight. Aeronautic research also focuses on the aerodynamics of space vehicles.

President Reagan in 1986 announced a new research program leading to an aerospace plane. The National Aero-Space Plane program is an accelerated technology development program leading to a flight research vehicle (X-30) that is anticipated to prove the capabilities of various aerospace technologies, including



Christopher C. Kraft, Jr., JSC Director 1972-1982

Yesterday's bums are tomorrow's heroes

By Christopher C. Kraft Jr.

The formation of NASA gave the NACA a new set of opportunities to contribute to the technological advancement of the United States. In particular, a number of NACA engineers were presented with the new and rigorous challenges of space that eventually ignited the imagination of the country and the world.

The triumphs and tragedies that have followed and produced the headlines of the past 30 years attest to the impact of NASA on our lives. There is no field of science or engineering that hasn't seen a significant change in its state of the art as a result of NASA's efforts over these exciting years. From Project Mercury to the Sea of Tranquility, from the Scout to the Space Shuttle, NASA has totally changed our view of the world and the Solar System in which we reside.

Anyone who has participated in these last 30 years has certainly lived in one of the most rewarding periods of our country's history and should be justly proud. However, an immortal

Brooklyn Dodgers fan coined a phrase, "yesterday's heroes are tomorrow's bums" and, similarly, NASA today is faced with a tarnished reputation as a result of the *Challenger* accident and its apparent malaise in dealing with the future.

The extraordinary challenges of today are no different in scope than they were 30 years ago. NASA is still composed of some of the best young people in the U.S. and is equipped to solve the most demanding problems. The return to flight of the Space Transportation System, the Hubble telescope, the coming trips to Venus and the outer planets, the Aero-Space plane, and the Space Station *Freedom* will certainly help to restore NASA's image.

What is needed is a NASA willing to overcome the bonds of bureaucracy, to deal with the issues in a straightforward and eloquent fashion, and to recognize that they, too, have to make some sacrifices in order to live up to the expectations that the country has come to look for.

horizontal takeoff and landing, single-stage operation to orbital speeds, and sustained hypersonic cruise within the atmosphere using airbreathing propulsion.

NASA research programs focusing on flight safety have investigated the problems of lightning, wind shear, icing and heavy rain, as well as runway and tire studies.

The Numerical Aerodynamic Simulation (NAS) Facility at Ames Research Center, Moffett Field, Calif., dedicated in 1987, is considered the world's most powerful computing system. Capable of computing complex air-flow conditions encountered in actual aircraft, NASA officials are using NAS to perform pioneering aeronautical research.

Meanwhile innovative testing goes on elsewhere within the NASA network. The National Transonic Facility at the Langley Research Center is a unique, world class wind tunnel using a cryogenic test gas capable of simulating actual flight parameters for advanced aerodynamics research. Also, the world's largest wind tunnel, NASA's 80-by-120 foot wind tunnel located at Ames Research Center became fully operational in 1987.

At NASA's Lewis Research Center, advanced propulsion research programs are expected to lead to more economical propulsion for commercial transport aircraft and for advanced hypersonic vehicles.

Flight testing of the NASA High Alpha flight research vehicle, a highly-instrumented F/A-18 aircraft, will provide valuable information for future supersonic aircraft capable of unprecedented agility and maneuverability. NASA researchers are conducting flight tests at the Dryden Flight Research Facility in Edwards, Calif.

Space science

NASA's space science programs and projects have explored virtually the entire solar system. The Voyager II spacecraft is expected to reach Neptune in August 1989, which would leave only planet Pluto as yet unexplored by deep space probes. Voyager I is in interstellar space after successful flybys of Jupiter and Saturn. After extensive interplanetary exploration, the Pioneer 10 spacecraft has left our solar system. As the most distant human-

made object in existence, it continues to make discoveries about interstellar space.

NASA satellites and airborne studies are providing global profiles of stratospheric aerosol and ozone, helping us to better understand the impact of the greenhouse gases. Expanded weather satellite system capabilities allow for sophisticated, high accuracy weather forecasting.

NASA's space applications program, in which satellite technology is directly applied to benefit people and a program that often includes international partners, has been a driving force for human programs. The Landsat program, for example, has provided an invaluable survey of the Earth's surface with applications to such diverse problems as agricultural management, environmental protection, beach erosion forecasting and prospecting for minerals and hydrocarbons. The National Oceanic and Atmospheric Administration now manages Landsat.

Satellite observatories far above the Earth's atmosphere have opened a window on the universe, providing new findings on Earth's magnetic field and atmosphere. The Hubble Space Telescope, which NASA officials expect to place in orbit in 1990, will distinguish fine details in planetary atmospheres with 10 times the clarity of the best ground observatories.

The Galileo mission to Jupiter, a joint project with the Federal Republic of Germany, will make a long-term study of the planet's atmosphere, magnetic field and its moons.

The Ulysses mission, a cooperative effort between NASA and the European Space Agency slated for launch in 1990, will provide the first view of the Sun and the Solar system from above the ecliptic plane, offering first knowledge about the Sun's magnetic poles.

Space station

A permanently manned U.S. space station, recently named Space Station *Freedom*, will provide an unsurpassed research center for scientific, technology and commercial activities in space and will serve as a base for continued exploration of the solar system in the next century.

NASA officials in December 1987 awarded four aerospace firms contracts and will initiate

detailed designs in January 1989 that will lead to a first element launch in 1995. Assembly of the station will require 20 launches, with crews permanently manning Space Station *Freedom* in 1996. Representatives from the European Space Agency, Japan and Canada, all partners in the space station project, signed a final agreement Sept. 29, 1988.

Space technology

NASA's Civilian Space Technology Initiative is a program designed to provide reliable, low-cost access to Earth orbit, and support science missions. NASA programs such as the University Space Design program and the University Space Engineering Research program have encouraged participation by the academic sector.

Technology utilization

NASA programs by nature are demanding of technological input. Meeting the aeronautical and space goals of the past three decades has required advancements across a broad spectrum that embraces virtually every scientific and technological discipline.

Technology related to space research has touched the lives of every American. Spinoffs from micro miniaturization technologies have led to medical devices ranging from programmable pacemakers to other biomedically implanted devices such as insulin pumps. In the medical field alone, there are thousands of direct spinoffs from NASA programs such as body imaging, laser technology and filtering processes, including those now used for blood.

Public safety uses of NASA technology include smoke and fire detection devices and a variety of fire resistant materials. Grooved highways, a surfacing technique that has dramatically reduced highway accidents, are a spinoff of an aeronautics runway safety program. A passive sewage treatment system using water hyacinths, such as the one being initiated by the city of San Diego, is one environmental application of NASA research.

Spinoff applications for consumer, home and recreational use alone are particularly broad. Materials originally developed for space suit use now are found in a variety of products as diverse as tennis shoes, food packaging and window shades. Spinoffs embrace areas such as transportation, structural analysis, food and agriculture, computer science, manufacturing technology, industrial productivity, energy systems and construction.

Commercial development

Amid a growing consensus that U.S. leadership in the commercial development of space is in the national economic interest, the President and Congress in 1984 directed NASA to significantly expand commercial space activity.

NASA responded by adopting a Commercial Use of Space Policy and establishing the Office of Commercial Programs to promote U.S. private sector investment and involvement in the civil space program.

NASA's cooperative efforts with U.S. industry over the past 30 years have accelerated the commercial application of aeronautical and space technology. Such efforts in the 1960s led to the emergence and growth of satellite communications, which has become a \$3 billion a year industry.

Today, more than half of the 50 largest U.S. industrial corporations are participating in NASA's programs. They are joined by scores of other companies that are investigating the commercial opportunities in space. These include private firms on the forefront of a U.S. commercial launch vehicle industry. NASA is supporting this new industry through agreements to introduce government developed rockets into the private sector, by providing access to NASA centers and agreeing to become a user of commercial launch services.

Since 1983, a growing number of America's small businesses have been contributing to NASA's mission through a program called Small Business Innovation Research (SBIR).

Toward the future

The presidentially appointed National Commission on Space has projected the next 50 years of America's future in space and proposed goals which assure America's continued leadership in space.

NASA Administrator Dr. James C. Fletcher June 1, 1987 announced the creation of the Office of Exploration to coordinate agency activities that would "expand the human presence beyond Earth," particularly to the moon and Mars.

The National Commission on Space described NASA as "...a national resource that plays a critical role in space exploration and development. It also provides a symbol of national pride and technological leadership. The Commission applauds NASA's spectacular achievements of the past and anticipates impressive achievements to come."

Weather prognosticators keep watch from JSC

(Continued from Page 1)

At that point, Ben Guerir's cloud cover began dissipating, but when the clouds went away the wind picked up. The smoke blew over at Moron, and that became the primary TAL site. But then rain showers started moving toward Kennedy Space Center, and cross-winds began to look as if they might become a problem.

"I had one ear on the phone to the Cape and the other on the phone

to the flight director," Sokol says.

In March 1987, forecasting abilities received a boost when a new computerized information system called Meteorological Interactive Data Display System (MIDDS) was installed.

In the past, forecasters relied on cut-and-paste facsimile maps. The new system provides forecasters with time-lapse computerized satellite photos from around the world and numerical models from the National Meteorological Center. The high-

resolution photos arrive at the rate of one every six to eight minutes. The system also provides information in Bldg. 4 and at Ellington Field for pilots flying local or cross-country flights.

"The amount of information is incredible," says Rotzoll, who also is head of the Techniques Development Unit that helps ensure the system is user friendly.

With MIDDS, the forecasters can not only see cloud formations and movements, but they can overlay the

satellite photos with graphic displays of the models or data from surface and upper air observations supplied by Zephyr, a private weather service. The added data helps reveal conditions that would not be seen easily in the photos alone.

"We have much quicker response," says Gerry Rigdon, chief of the Spaceflight Meteorology Group, explaining that every minute counts. "The lead forecaster is under a lot of pressure for launch and landing.

It's a difficult job."

But while MIDDS provides more complete and timely information, Sokol says, it's still up to the forecasters to make sense of the data.

"No system is ever going to change the weather and make it better, so you need good sense and good judgment to get through the mission," he said. "Weathermen are always subject to not being right. We can't win them all, but we try not to make a habit of losing."



Engineers in this packed Mission Evaluation Room helped decide how to cope with the malfunctions encountered during STS-26.

Team efforts devised Discovery fixes

By James Hartsfield

On the surface, two problems during STS-26 may have appeared to almost solve themselves. But in reality, the two problems—one with the flash evaporator subsystem (FES) and another with the Ku-band antenna—were resolved in a flurry of quick, careful work from a host of flight controllers, engineers and the crew.

Flight controllers first saw a problem with the FES shortly after main engine cutoff, said Steve McLendon, ascent and entry electrical, environmental and consumables manager (EECOM) for STS-26. The FES is a system that uses evaporation to cool the Orbiter mainly during ascent and entry, but also as a supplement to the payload bay door radiators on-orbit.

The two evaporators of the FES, called the high-load and topper evaporators, spray water on freon loops to cool them, and the freon is then recirculated through the system. The two evaporators are somewhat redundant, although the high-load has a higher capacity.

McLendon said temperature measurements from sensors in the high-load evaporator's steam duct dropped from 250 degrees Fahrenheit to 40 degrees F, leading engineers to suspect that ice had blocked the vent that carries the steam outside the Orbiter. "We turned on both redundant sets of heaters in the duct and increased the temperature of freon flowing into the system," McLendon said. "The question was whether or not the high-load was recoverable." The high-load was powered down and left that way until just before it was needed for entry.

After extensive analysis, and several run-throughs of procedures

in the Shuttle Mission Simulator, two checklists were developed and sent to the crew. One consisted of extensive changes in the preparations to be made for *Discovery's* deorbit burn. Another was a checklist to be followed in case the high-load evaporator didn't work once it was powered up. The team analyzing the problem in the Mission Evaluation Room (MER) was led by Hank Rotter, FES manager.

"It was a general procedure that would take into account all possible scenarios," McLendon said. "We had worked very diligently on getting those checklists finalized. I've never seen so many people work together so cohesively and so many people come in with such good inputs. I was really amazed; it was good to see people working together like that."

Many of the procedures weren't needed. The suspicions about ice being the root of the FES problems apparently were correct, and the high-load evaporator worked perfectly during entry.

A second problem that had engineers thinking quickly during the flight appeared in the Ku-band antenna, a dish antenna that folds out of the payload bay during orbit. The antenna worked well for a few hours, but then the ability to aim it consistently was lost.

"We don't know specifically what happened," explained Mark Schmalz, team leader at the Communications and Tracking console in the MER. "But the odds-on favorite was that there had been an incomplete or partial retraction of the stow pins that lock the antenna in place during ascent and entry."

Support contractors from Rockwell and Hughes Aircraft successfully simulated the problems the

antenna was experiencing in the Electronics Systems Test Laboratory in Bldg. 44, and the stow pins gained strength as the possible cause. "Sometimes the best failures are hard failures. When something fails completely—at least you usually know what the problem is," Schmalz said. "But that wasn't the case here. It was peculiar; sometimes the antenna wouldn't point right and sometimes it would."

After simulating the problem on the ground, gaining insight from John Griffin, Ku-band subsystem manager, and getting input from engineers at Kennedy Space Center who had conducted pre-launch tests of the antenna, the team settled on a conservative approach. The antenna would be stowed and not used for the rest of the flight.

"The only option other than stowing it was either an extravehicular activity or a jettison of the antenna," Schmalz explained. But when the crew attempted to stow the antenna, it was stopped short due to a steady oscillation of the dish.

The team went back to work and derived another mode of stabilizing the antenna as it was being stowed, and, several orbits later, the stowing job was completed successfully. "It was truly a team effort," Schmalz said. "That's the kind of thing the MER and the Engineering Directorate are there for."

But the team's work on the antenna didn't stop once it was stowed. "Afterward, we began to look more closely at what we should try to find once the payload bay doors are opened back at Kennedy," he said. "We really won't know exactly what the problem was until we get a chance to look at it."

Air Force disbands manned spaceflight squadron at JSC

The Air Force's 1st Manned Spaceflight Control Squadron (MSCS), a unit of the Space Command stationed at JSC now numbering about 90 members, is in the process of being disbanded and is scheduled to be completely deactivated by June 1989.

The deactivation of the unit was officially announced in August, and members of the unit are gradually being reassigned by the Air Force, Air Force spokesman Capt. Al Wylie said. The reassignment of personnel in the unit is being studied on a case-by-case basis in an attempt to make the transition as smooth as possible for those individuals, for NASA and for the Air Force, Wylie said.

The 1st MSCS originally was created to allow Air Force personnel to get hands-on training for eventually staffing manned spaceflight operations in-house. But the cancellation of plans for an Air Force flight control center to be built at Falcon Air Force Base in Colorado Springs, coupled with a decision not to use an Air Force Shuttle launching facility at Vandenberg Air Force Base, precipitated the disbanding of the MSCS.

"The Department of Defense feels a lot of the justification for the MSCS being here just doesn't exist any longer," Wylie explained. "Our original purpose for being here was not to fly missions, but rather to train to fly missions for when we were going to be staffing them ourselves."

JSC's loss of the 1st MSCS will be a sad one for both parties. "I hate to see them go," said Director of Mission Operations Eugene Kranz. "Overall, the Air Force personnel have been an essential element of our team throughout the entire Shuttle program, and they were principal contributors to the successes we have enjoyed."

1st MSCS personnel have done superb work for NASA, and they have contributed to the agency in a variety of ways. "They were key controllers and instructors, and two members of

the Air Force contingent became flight directors," Kranz explained. "They brought good traditions with them to JSC—the basic discipline, motivation and can-do attitude they exhibited rubbed off on some of our newer employees in MOD (Mission Operations Directorate). Their mark will be felt for years to come."

"Our relationship with NASA has always been super," 1st MSCS Commander Lt. Col. Edmiro Muniz added. "It's been beneficial to both. When we leave here, we take a very unique experience not available anywhere else in the Air Force."

The experience members of the unit have gained in flight control and in technical management is invaluable, Muniz said.

Most of the 90 members of the 1st MSCS work in JSC mission operations while some are in mission support. The Air Force personnel work on all Shuttle missions and not on only Department of Defense missions, Wylie said.

Due to their active training for upcoming missions, the Air Force will not reassign any personnel in mission-critical positions until after two more Shuttle flights are completed.

In addition to the 90 military personnel assigned to the MSCS, three civil service personnel work in support of the squadron. Attempts will be made to reassign the civil service workers to NASA positions, and some of the military personnel already have opted to accept civil service or contractor positions with the NASA team.

The 1st MSCS was instituted at JSC as the Manned Spaceflight Support Group of the Air Force Systems Command in 1979. In December 1985, it was renamed the 1st MSCS and became a unit of the Air Force Space Command.

At its peak, the squadron had 134 members, 127 officers, four enlisted personnel and three civilian employees.

Fletcher favors lunar base, then manned Mars mission

(Continued on Page 4)

Fletcher said, calling Space Station *Freedom* "the essential link that will join the past and the future."

He said those four potential futures include:

- A four-person, or possibly two-person, flight to one of Mars' two moons, Phobos or Deimos, landing in 2003;

- A manned flight to Mars landing by 2007;

- The establishment of a scientific base on the Moon, landing in 2004; or

- The establishment of a lunar outpost by 2004 as a precursor and staging area for a Martian landing in 2014.

Many questions, including cost estimates, remain about these potential missions, but by the early 1990s or before "a goal will be presented to the NASA administrator for recommendation to the president," he said.

Still, Fletcher said he now favors the option calling for a manned lunar outpost by 2004 followed by a Mars

mission in 2014. Such a plan could allow the lunar outpost mission to be a testbed for the technology that would be needed for the ensuing Mars flight, he explained. The experience and machinery developed as a result of the lunar outpost "would go a long way to help reduce the risks and costs of building a Mars outpost," he added.

"The human race will eventually want breathing room, and space will provide it," Fletcher said.

The president should and must be the one to decide on a long-term space goal for the nation, he added. "And once that goal is confirmed by Congress and approved by the American people, NASA will make it happen."

But Fletcher advised those who want the country to set a long-term goal immediately to be "prudent and patient." The next president will set a space goal only after NASA has done its homework, and when he believes NASA has a good chance at success, he added.

Redesign inspection results good

(Continued from Page 1)

The cork insulation surrounding each joint contained between one and three liters of seawater. Several other torn cables and sheared bolts were found along the length of the boosters, and the external tank attachment ring on the right-hand booster was bent. But the findings are not a flight safety issue, Lofton said.

"There was some thermal protection system damage and structure damage due to water impact, but nothing awfully unusual," Lofton added.

The cause of a shallow scrape across six thermal protection system tiles on *Discovery* may or may not have been caused by debris from the SRMs. "We did find some missing cork (on the SRMs), but there's really no way to tell if that missing cork was the cause of any damage," Lofton said. The scrape was not a hazard to the Orbiter, but the six tiles will be replaced.

Discovery is now in Bay 1 of the Orbiter Processing Facility at Kennedy, undergoing preparations for its next mission, STS-29 scheduled for Feb-

ruary. This week, technicians are removing the OASIS instrumentation from the payload bay for analysis. Also, the Ku-band antenna will be removed for troubleshooting to determine the cause of in-flight problems.

The vendor for the Orbiter's flash evaporator system (FES) has been at Kennedy to study that system's in-flight troubles. From the main engines, the gaseous oxygen flow control (GOX) valves were removed earlier this week and shipped back to the contractor for post-flight analysis.